

Amendments to the Specification:

Replace paragraph [0003] with the following amended paragraph:

[0003] As is well known to those of skill in the art, passive and hybrid microelectronic circuit components (hereinafter circuit “components”), are fabricated in an array on or in the interior of a ceramic substrate. The ceramic substrate is cut, sometimes called diced, to singulate the circuit components from one another.

Replace paragraph [0009] with the following amended paragraph:

[0009] One prior art attempt to singulate these smaller and thinner circuit components entailed sawing through the ceramic substrate using a saw blade that had been aligned with a “street” created by the thick and thin film patterns formed on or in the interior of the ceramic substrate as part of the process of forming the circuit components. Alignment of the saw blade and street was achieved using an alignment system. Tape was preferably attached to the ceramic substrate before sawing to provide support for the singulated circuit components upon completion of sawing. Problems with this prior art method include inexact positioning and alignment of the saw blade, mechanical wobbling of the saw blade, and uneven or rough surfaces resulting from the mechanical nature of cutting with a saw blade. Further, the width of the scribe line had to be sufficiently large to accommodate the width of the saw blade. A typical saw blade is 75-150 microns wide along its cutting axis, producing cuts that are about 150 microns wide. Because the resulting scribe lines had relatively large widths and therefore occupied a greater portion of substrate surface, fewer components could be produced for any given size of ceramic substrate. This resulted in more wasted surface area, less surface area available for circuit component parts, and a greater than optimal cost of each circuit component.

Replace paragraph [0016] with the following amended paragraph:

[0016] An object of the present invention is, therefore, to provide a method by which a ceramic substrate, ~~onto~~ on a surface or in the interior of which ~~has~~ have

been affixed formed multiple evenly evenly spaced electronic components, may be cleanly singulated into separate circuit components, including, *e.g.*, capacitors, filters, and resistors.

Replace paragraph [0028] with the following amended paragraph:

[0028] The present invention entails directing a laser beam emitted by a solid-state ultraviolet laser to form a scribe line on a ceramic substrate. The ceramic substrate absorbs the energy from the emitted laser beam, thereby effecting depthwise removal of a portion of the ceramic substrate to form a shallow trench along the streets created by patterns formed on a surface or in the interior of the ceramic substrate as part of the process of forming the circuit components. Depending on the type of circuit components being fabricated, the patterns are typically formed by thick film processing (*e.g.*, by screen printing for thick film resistors or multi-layer chip capacitors (MLCCs)) or by thin film processing (*e.g.*, by vacuum deposition). The shallow trench includes two side walls extending from the ceramic substrate surface and converging to form a clearly defined snap line at the bottom of the trench such that the trench has a cross section that is approximately triangular in shape (a wide opening and an apex). The depth of the trench is preferably sufficiently shallow such that the trench does not appreciably penetrate the thickness of the ceramic substrate, thereby minimizing the formation of microcracks in the ceramic substrate that extend perpendicular to the scribe line. Further, the laser beam preferably has a wavelength that is sufficient to minimize resolidification of the ceramic substrate along the sidewalls of the scribe line.

Replace paragraph [0038] with the following amended paragraph:

[0038] The ceramic substrate is then singulated into multiple pieces by application of a tensile breakage force perpendicular to the scribe line. Trench 36 is preferably triangle-shaped such that the application of a breakage force on both sides of trench 36 causes ceramic substrate 10 to cleanly break along snap line 44. The resulting multiple circuit components include side margins that portions of which were originally trench side walls 40.

Replace paragraph [0050] with the following amended paragraph:

[0050] The laser beam was moved at a programmed speed of 100 mm/s and an effective speed of 50 mm/s. The stability of the laser system was approximately 100%, and the total depth of the scribe line was approximately 28 microns. Because the bite size was approximately 2 microns, there was significant overlap in each of ~~the two repetitions~~ two passes. Following formation of the scribe line, the ceramic material was broken along the line to form two singulated circuit components that were examined with a light microscope to evaluate cut quality, depth, and features. The edge break areas on the scribed circuit components lacked significant slag residue.

Replace paragraph [0055] with the following amended paragraph:

[0055] Further, multi-layer ceramic components, such as MLCCs including a copper layer, can be scribed using the method of the present invention without destroying the integrity of the other layers. In one embodiment, the green layers of a ceramic filter 49 may be stacked and then the resulting ceramic filter structure may be fired. As shown in Fig. 7, ceramic filter [[48]] 49 may include a chip 50 that is coated with a laminate 52 and a copper hermetic coating 54. Chip 50 sits atop a ceramic substrate 62. Prior art methods of mechanically sawing through copper hermetic coating 54 unacceptably damaged laminate 52. Also, due to the ductile nature of copper, mechanically sawing the top layer was unacceptably slow. The method of the present invention allows copper hermetic layer 54 of ceramic filter [[48]] 49 to be cut with a UV laser beam having an energy and spot size sufficient to singulate copper hermetic coating 54 and ceramic substrate 62 without damaging laminate 52. The UV laser used in connection with the method of the present invention may be programmed to cut through copper hermetic coating 54 and to leave in ceramic substrate 62 a trench having a snap line along which ceramic substrate 62 may be singulated into separate, nominally identical circuit components. Alternatively, the UV laser used in connection with the method of the present invention may be programmed to cut through copper hermetic coating 54 without affecting ceramic substrate 62. The laser may then be reprogrammed to have an energy and spot size sufficient to form a scribe line in accordance with the

method of the present invention along which ceramic substrate 62 may be singulated into separate, nominally identical circuit components.